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ABSTRACT

A faculty development program designed to encourage critical thinking skills across the curriculum at the University of Wisconsin Eau Claire is described in this report. The program's goal was to stimulate faculty to add critical thinking to their pedagogical objectives. Faculty participants attended six 4-hour meetings designed to heighten their awareness and appreciation of critical thinking. They were randomly assigned to a 50-member program group or to a 22-member control group. The six meetings discussed the following: a definition and discussion of critical thinking; the adaptability of different teaching styles to critical thinking; the extent to which participants engaged in critical thinking and pedagogical activities consistent with critical thinking objectives; evaluation of critical thinking behavior; small group discussion of 38 plans made by participants; and sharing lessons learned while implementing the plans. Results indicate the program did not increase scores of faculty participants on the Ennis-Weir Critical Thinking Essay Test. Also, students sampled from classes taught by control and experimental faculty did not differ on posttest measures. Problems faced by such faculty development projects include: different needs among faculty from different disciplines; reluctance of faculty to admit skill deficiencies; and difficulty matching faculty development program and evaluation instruments. Faculty noted that students often resist critical thinking, and critical thinking pedagogy is very time consuming. Contains 14 references. (Author/SM)

# Stimulating Critical Thinking Through Faculty Development: Design, Evaluation, and Problems

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## AASCU/ERIC Model Programs Inventory Project

The AASCU/ERIC Model Programs Inventory is a two-year project seeking to establish and test a model system for collecting and disseminating information on model programs at AASCU-member institutions--375 of the public four-year colleges and universities in the United States.

The four objectives of the project are:

- To increase the information on model programs available to all institutions through the ERIC system
- To encourage the use of the ERIC system by AASCU institutions
- To improve AASCU's ability to know about, and share information on, activities at member institutions, and
- To test a model for collaboration with ERIC that other national organizations might adopt.

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Abstract

A faculty development program at a midwestern state university attempted to encourage the development of critical thinking skills across the curriculum. Faculty participants regularly attended six, four-hour meetings designed to heighten their awareness and appreciation of critical thinking. The program's primary goal was to stimulate faculty to add critical thinking to their pedagogical objectives. Faculty were randomly assigned to a 50 member program group or to a 22 member control group. A large majority of faculty participants attended all six meetings and developed classroom plans indicating their intention to encourage critical thinking. The program did not increase scores of faculty participants on the Ennis-Weir Critical Thinking Essay Test. Students sampled from classes taught by control and experimental faculty did not differ on posttest measures. Several problems faced by such faculty development projects were identified, including different needs among faculty from different disciplines, reluctance of faculty to admit skill deficiencies, and difficulty of matching faculty development program and evaluation instruments.

The extensive current interest in critical thinking has generated numerous faculty development efforts hoping to alert faculty to the need for a greater focus on higher-order cognitive thinking in their classrooms. While faculty attest to the importance of critical thinking in their institutions and disciplines, their actual behavior frequently belies their alleged devotion to critical thinking. Faculty development programs might be able to bridge the gap between loyalty to critical thinking in the abstract and teaching it in the classroom.

Faculty development programs of any type are rarely evaluated; their minimal budgets do not permit such a luxury. Consequently, the opportunity to learn from the faculty development experiences of other colleges and universities is limited. This article attempts to rectify that failure in a small way by sharing the design, evaluation, and problems of a faculty development effort at the University of Wisconsin-Eau Claire (UWEC). UWEC employs approximately 550 full-time faculty who teach approximately 11,000 undergraduates and 540 graduates.

The program at UWEC offered an unusually good opportunity to study faculty development efforts for several reasons. First, the faculty currently emphasize their teaching responsibilities and, thus, see faculty development oriented toward teaching as a logical and desirable aspect of their career development. Second, the program avoided the typical one-day, quick-fix faculty development session. Instead, the UWEC program occurred over one academic year at multiple sessions. Third, the UWEC program reflected a desire to evaluate the impact of the program, enabling others to profit from the experience.

The first component of this article describes the faculty development program at UWEC. Then succeeding sections discuss the evaluation of and

problems associated with this attempt to encourage critical thinking across the curriculum.

## I. Design of the program

### A. Facilitators and Participants

The project director, Leonard Gibbs, chose the program facilitators through a literature review, seeking studies that reported empirical evidence concerning acquisition of critical thinking skills (Gibbs, 1985). Based on that review, the project director chose Professors M. Neil Browne and Stuart M. Keeley of Bowling Green State University as primary facilitators. One or both of them were involved in the planning and presentation of each program meeting. Professor Robert Ennis of the University of Illinois-Champaign and Professor Michael Hakeem of the University of Wisconsin-Madison each conducted part of one program session. All four had extensive experience teaching critical thinking, while three of the four are actively engaged in critical thinking research.

The program at UWEC was initiated in March of 1985 by a flyer describing the program. The flyer indicated that each participant would receive $200, and it listed the following requirements for participation: (1) attendance at six, four-hour programs; (2) creation of a 3-4 page plan for integrating critical thinking into a course for the Spring Semester of 1986; (3) sharing their plans with other participants; and (4) cooperation with the evaluation of the program.

By the end of May 1985, 72 had applied for the program. These 72 were randomly assigned to the experimental group (N=50) or to the control group (N=22). Table 1 lists the initial frequency of participants from various disciplines in each group. Among the original 50 experimentals, three left the university (one each in Philosophy, Psychology, and Nursing); three

declined to participate (two in English and one in Secondary and Continuing Education); three started the project but declined to finish (one each in Social Work, Philosophy, and Elementary Education). Thus, 41 (82%) of the original experimentals fully participated. In addition, four randomly selected controls (two in Mathematics, one in Accountancy, and one in Library Science) accepted an offer to join the experimental group during the program, raising the total number of experimental subjects to 45. Two control group members declined to participate; hence a total of six (27%) of the control group were lost from the original control group roster. The disciplines of nursing and English represented a disproportionate share of the experimental group, accounting for ~~23%~~ 38% of the program participants.

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Insert Table 1 about here

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B. Program Content

Program participants attended the first four programs in the Fall Semester of 1985 and the last two in the Spring Semester of 1986. Participants were asked to share copies of Browne and Keeley's critical thinking text, Asking the Right Questions. In addition, a few copies of other texts (Kahane, 1984; Radner & Radner, 1982; Giere, 1984; Cederblom & Paulson, 1982) were given to participants.

The initial meeting in August 1985 consisted of defining critical thinking, a discussion of attitudes required for critical thought, and an overview of critical thinking skills. Participants had been asked to prepare for the first meeting by reading the first five chapters of Asking the Right Questions. Primary activities included lectures and discussion on attitudes

that can block critical thinking, a working definition of critical thinking, and application of that definition to a 2-page essay entitled "Returnable Bottles and Cans." Interactions with program facilitators were used to indicate strengths and weaknesses in faculty understanding of critical thinking.

The second session in September 1985 focused on the adaptability of different teaching styles to critical thinking, as well as a discussion of the final chapters of Asking the Right Questions. As preparation for this session, faculty rated themselves on a scale of teaching styles (Pfeiffer and Jones, 1974). The self-ratings demonstrated that the majority (30 of 46 attending) were concerned about active student involvement and the need for covering course content. Program facilitators led a discussion aimed at pointing out the incompatibility between the active involvement required to teach critical thinking and the desire to "cover" the maximum amount of material.

The primary activity of the second session consisted of dividing the faculty into two groups - one preferring a more didactic approach and another preferring to participate in discussions about critical thinking skills. Common fallacies were enumerated and applied to brief written arguments about the harmful effects of television, gun control laws and other social issues.

The third session in October 1985 centered on (1) the extent to which the participants themselves engaged in critical thinking and (2) pedagogical activities consistent with critical thinking objectives. In preparation for this session, participants were asked to: (1) view a one-hour, slide tape description of a Stanford University Prison Experiment (Zimbardo, undated); (2) read Philip Zimbardo's (1971) congressional testimony regarding the experiment; and (3) write a one-page "reaction" to Zimbardo's experiment.

At the session, the participants' reactions were compared to the program facilitators' evaluation of the experiment. The purpose of this activity was to demonstrate the importance of: (1) knowing what to look for and (2) desiring to find inadequacies as prerequisites to critical thought. Fifty percent of faculty participants in their written reactions accepted the experiment uncritically, indicating the infrequency of critical thinking approaches even among the professorate.

The remainder of the third session consisted of teaching tips for encouraging critical thinking, including questioning techniques and hints for stimulating productive student reactions. Participants discussed their reactions to illustrative classroom videotapes prepared by the project director and program facilitators. Finally faculty met in small groups to discuss the development of their personal plans for integrating critical thinking into one of their courses. To help participants construct their plans, they were given an outline of Bloom's Taxonomy of Educational Objectives (Bloom, Engelhart, Furst, Hill & Krathwohl, 1956), a handout discussing the importance of and methods for preparing specific goals and objectives, and a sample plan prepared by the project director.

The fourth session in November 1985 was devoted to evaluation of critical thinking behavior. Slides of items from common critical thinking tests illustrated the complexity of assessment in this domain. Participants were urged to see testing as an integral part of curriculum planning and instruction. Also discussed were advantages and disadvantages of multiple choice and essay instruments with special emphasis on the relative superiority of essay questions for most forms of critical thinking.

Participants were asked to bring their plans for integrating critical thinking into a prospective course to the fifth session. The entire fifth

session in January 1986 consisted of small group discussion of the 38 plans prepared by participants. Each participant described his or her proposed plan and then received suggestions from other participants and program facilitators.

The sixth session in April 1986 offered participants an opportunity to share lessons they had learned while attempting to implement the plans they had prepared for the program. The 25 participants were divided into four groups to summarize their experiences for their colleagues.

Evaluation Procedures

The program's impact was assessed qualitatively and quantitatively. The major qualitative data were the subjective impressions of the program facilitators, which were recorded following each training session, the participants' written plans for integrating critical thinking into their course, participants' responses to post session questionnaires, and participants' discussion of "lessons learned" during the sixth session. A more detailed account of the program's evaluation is available from the authors (Gibbs, 1987).

Quantitative data were collected within the context of a pretest-posttest experiment design. The following four measures were utilized:

(1) The Watson-Glaser Critical Thinking Appraisal Test (Forms A and B). These two parallel form, multiple choice tests assess five critical thinking dimensions: inference (discriminating among degrees of truth or untruth of inferences), recognition of assumptions, deduction, interpretation (weighing evidence and deciding whether generalizations based on the given data are warranted), and evaluation of arguments. The Watson-Glaser tests (1980) can be machine scored and have norms for students from ninth grade to college. Spearman-Brown split-half reliability coefficients range from .69 to .85 and alternate form reliability was .75 (Watson & Glaser, 1980, p. 10).

(2) The Class Activities Questionnaire (CAQ). The CAQ, developed by Steele (1982), is a 25 item instrument, which asks students to agree or disagree on a four point scale with statements describing general kinds of activities that characterized their class. The "Lower thought Process-Higher Thought Process" dimension of the CAQ stresses cognitive skills. This study uses the Higher Thought Process Score (application, analysis, synthesis, and evaluation) determined by summing the four top items of the scale. A secondary measure of interest is the response to the following item: On the average, the teacher talks how much of the time? Reliability figures are not available for revisions of this form.

(3) The Ennis-Weir Critical Thinking Test (1985). This is a brief nine-paragraph essay, to which respondents write their reactions, paragraph by paragraph, within a 40 minute time limit. Each paragraph presents a reason supporting the writer's conclusion. The test stresses student ability to spot logical flaws in reasoning, emphasizing the following kind of flaws: equivocation, irrelevance, circularity, reversal of if-then reasoning, the straw person fallacy, overgeneralizing, and the use of emotive language to persuade. Faculty essays were scored independently for this study by two experienced faculty at other universities, who attained an interrater reliability coefficient of .96. These raters applied a modified version of the Ennis-Weir scoring system, one which required more sophisticated explanations; thus, scores are somewhat conservative relative to the Ennis-Weir norms. Ennis and Weir (1985) report inter-rater reliability of .86 and .82 in two trials (p. 4).

Our testing procedures were as follows. Faculty participants were assigned to their respective groups in June of 1985. In July, they completed a mailed Watson-Glaser Critical Thinking Appraisal Test (Form A) as a pretest

to determine whether the two groups differed on initial critical thinking ability. Then, following the fifth program session in January 1986, participants and controls completed a mailed Ennis-Weir Critical Thinking Test as a posttest. They were instructed to follow test instructions and to return the test in 30 days.

In April, three students were randomly selected from each class for which program faculty had filed a course plan and from the one course each control faculty selected as best teaching critical thinking. These students completed the Watson-Glaser Test (Form B) and the Class Activities Questionnaire. A letter accompanying the measures informed students of their random selection, the study's importance and the fact that their responses would not affect their course grade.

Evaluation of Program

Evaluation of the faculty development program is discussed within the context of a series of questions that address its goals.

Question #1. Can an extensive critical thinking faculty development program, utilizing a very moderate monetary incentive, maintain the active involvement of faculty at a large teaching-oriented state university?

The answer to this question is an emphatic "Yes." Six program meetings were attended by 48, 47, 45, 39, and 25 faculty, respectively; and 38 faculty (76% of the initially selected group) submitted course plans in time for binding for discussion at the fifth meeting.

Question #2. Did the program have an impact on the faculty's awareness of the meaning of the critical thinking process and on their intent to include critical thinking as a component of their pedagogical plans?

This question is much more difficult to answer than the first one, since no clear index of pre-workshop faculty classroom planning behavior is

available. Additionally, the best evidence to address this question is the extent to which faculty attempt to incorporate behaviors that facilitate critical thinking in their future classrooms. Some tentative answers are provided, however, by faculty written plans and by their self-reports during and following the meetings.

First, 38 participants submitted lengthy plans for integrating critical thinking into their classrooms, and all these plans incorporated some procedure to elicit critical thinking from the students. Thus, faculty were sufficiently aware of the concept that they could incorporate at least some components into their written plans--whether or not they actually carried out the plans effectively. In addition, during the last half-hour of the fifth meeting, the 38 participants who had constructed plans answered several questions about their intentions for teaching during the 1986 spring semester; their answers support an affirmative answer to Question #2.

Everyone stated they intended to teach differently in some way. What these differences might be varied markedly. Some intended to pose more questions to students (n=6), teach critical thinking regarding issues in their subject area (n=4), use more discussion and less lecture (n=3), and ask students to analyze mathematical problems (n=3).

Nineteen said that they intended to change examinations. Among the ways they might do this were using fewer "memory" items (n=6), incorporating more items involving analysis, evaluation, and synthesis (n=5), and including more items that might involve discussion (n=3). Twenty-seven said they intended to include more opposing viewpoints.

While it was our impression throughout the workshops that most faculty fully desired to and intended to make critical thinking a more major element of their classroom climate, we failed to collect data directly addressing the

following very important question: What conception of critical thinking did faculty participants internalize as a function of their program involvement? That is, had we created a new understanding of critical thinking? If so, what did that understanding consist of? It was clear to us at the beginning of the training that most participants had only a vague notion of what they meant by critical thinking. Our belief is that they had a much more coherent sense of the term at the end of the training.

Question #3. What lessons did faculty learn while trying to integrate critical thinking into their classroom?

Participants were asked this question at the sixth session. Observations reported in summaries of the group discussions share several common themes:

1. Students often resist critical thinking;
2. Critical thinking pedagogy is very time consuming;
3. Allowing students to practice critical thinking is a more effective teaching mode than telling them how to think critically, and
4. A big stumbling block to teaching critical thinking is the tendency of students to link their self-worth to the quality of any argument they make.

In summary, the answers to questions 1-3 strongly suggest that a large number of participants made a real effort to integrate critical thinking into their classrooms.

Question #4. Did the training program have an impact upon the critical thinking ability of participating faculty?

Program participants and control group faculty did not differ with statistical significance on the pretest Watson-Glaser (Form A). However, controls had statistically significantly higher posttest scores on the Ennis-Weir Critical Thinking Test (independent t, $P<.03$). This finding is limited in its implications for several reasons.

First, while enhancing critical thinking skills initially seemed like a reasonable goal, it became obvious to us as the training progressed that it was impossible to build into the training sufficient time for faulty to practice critical thinking activity. While most did "read" at least one book on critical thinking, training sessions required very little practice of the skills. Thus, we would not expect the experimental group to be superior "critical thinkers" as a result of their workshop involvement. The primary facilitators' experience teaching honor students implies that more time is needed to teach thinking skills to faculty.

Second, we selected the Ennis-Weir Test as a dependent measure primarily because of its essay format. As we familiarized ourselves more with this instrument, we became increasingly aware of its limitations. This test emphasizes the ability to spot rather obvious reasoning fallacies embedded within very brief arguments. Its validity for measuring the broader concept of critical thinking presented in Browne and Keeley (1982) remains to be demonstrated.

The most likely explanation, however, for the control group's superior performance at posttest on Ennis-Weir is compensatory rivalry (Cook and Campbell, 1979, p. 55). The control group may have resented not being selected for the program and may have spent more time and care on their answers. The control group wrote longer answers, (75 words longer) indicating that they may have been more highly motivated to do well on Ennis-Weir.

Question #5. Did the program have an impact on the critical thinking ability of students exposed to participating faculty?

Question #6. Did the program have an impact on the level of cognitive activity exhibited by the classrooms of program participants?

These two questions are treated jointly because they are based on data collected from the same groups of students and because these data suffer from similar limitations. Data support a "No" answer to both questions, but the data are seriously limited by sampling biases.

Students selected from the classes of the experimental group did not differ significantly from those selected from the control group on the Watson-Glaser Test of Critical Thinking (Form B) or in their responses to the CAQ. Also, the two groups did not differ significantly in the rated proportion of time that their teacher talks in class. However, despite the random assignment procedures, the two groups differed dramatically in the kinds of classes being taught; thus the groups lack comparability of course goals. For example, it may be much easier to emphasize critical thinking in a political science course than in an accounting course. Secondly, the intervention period was very brief, and program faculty were still novices in applying new strategies. Thirdly, only three students were randomly selected form each experimental and control class; so statistical power to detect differences is extremely limited.

In our opinion, the most effective means of improving student thinking is a massive, long-term effort by multiple faculty to stimulate such skills. Our hope is that enough of the participating faculty will strive to emphasize critical thinking in their classrooms over a lengthy period of time such that a cumulative effect upon the students can occur.

Question #7. What problems were encountered in presenting and evaluating a faculty development program attempting to integrate critical thinking across the curriculum?

The only problems this section will mention are those that would be common in similar attempts to encourage critical thinking through faculty

development efforts. Each campus has its own contextual strengths and problems. There are, however, certain problems that may naturally arise on any campus, aspiring to imitate this type of faculty development. First, whether or not the feelings are legitimate, faculty feel that certain disciplines are more or less appropriate for encouraging critical thinking. Disciplines in the social sciences and humanities are generally seen as full of controversies and paradigmatic struggles. Hence, critical thinking is a natural educational objective in such disciplines. Professional fields and the natural sciences are often viewed by faculty in those disciplines as collections of truths. Such a conception leads understandably to a pedagogical approach permitting rapid and thorough dissemination of these truths.

It is not our purpose here to assess these perceptions. Those who establish faculty development efforts have an obligation to understand how faculty perceive their needs. By sharing the observation that typical members of particular disciplines will be more receptive to critical thinking, we hope to contribute to that understanding. It may not be optimal to include faculty from all disciplines in a single program, given their disparate perceptions of the relevance of critical thinking.

A second problem is the differences among faculty in their desire for didactic faculty development efforts. Very early in the UWEC program, feedback from participants made it abundantly clear that about two-thirds of participants wanted to listen to the program facilitators as the primary activity for each session. Another, more self-confident group were uncomfortable in such a setting. They wanted the give and take of a robust discussion. Because multiple facilitators were present at almost all the sessions, we were able to meet these preferences by dividing participants into

groups and adapting the faculty development mode to the specific group. Faculty, in general, responded very favorably to this division.

Another difficulty faced by this project was the reluctance of faculty to admit their own lack of familiarity with critical thinking. Participants were, on the whole, very interested in the quality of their teaching. In fact, it is fair to say that the UWEC faculty are unusually concerned with pedagogical responsibilities. Still they share with their peers on other campuses a hesitancy to devote large amounts of time to sharpening their own critical thinking skills. Instead, they wanted to move quickly to discussions about how to teach and evaluate critical thinking.

A fourth problem is caused by the paucity of instruments for measuring critical thinking. How can quantitative measures be used to indicate program effects when the match between program objectives and the few available instruments is crude? Existing instruments capture very few of the congeries of skills and attitudes comprising critical thinking. Quantitative program evaluation is stymied by this situation.

## Conclusion

An isolated critical thinking course or a few solitary courses in which critical thinking is a major objective will probably not have any long-term impact on the extent of critical thinking among our students. Critical thinking is too complicated a process and too divergent from what is expected in typical classrooms to be responsive to infrequent reinforcement. Thus, faculty development with critical thinking as an objective has significant potential. But it is a challenge to bridge the gap between our intentions and our behavior when it comes to critical thinking in classrooms.

Those of us who are optimistic about the prospects for faculty development in this area must be informed by insights gleaned from projects

like that at UWEC. First, several faculty development sessions devoted to critical thinking are a prerequisite for any lasting institutional effect. Those who conceptualized the UWEC project realized that one-session faculty development workshops covering complicated topics make little sense. Yet even with the six sessions, we felt that a minority of faculty in the UWEC program were still very unsure about what critical thinking denotes.

To be effective, faculty development programs require faculty to get involved in activities that include for example, critical reading, preparing lesson plans, and collecting course materials. These activities place demands on top of already heavy teaching and advising loads, to say nothing of other faculty responsibilities. Consequently, we think that development programs should require that faculty achieve specific learning goals and objectives, and faculty members should be given the release time needed to achieve these ends.

Another generalization that can be drawn from the UWEC project is the omnipresent tension between the desire of most instructors to cover content (usually implying that their lectures are the vehicle for coverage) and the reverence for critical thinking as a pedagogical goal. Mathematicians, faculty in professional schools, and natural scientists are especially likely to verbalize this conflict and to choose coverage over critical thinking in most situations. However, even for faculty not in these groups, many feel that to add critical thinking as an objective dilutes thereby their devotion to their discipline. Faculty development planners must anticipate this tension and address it directly.

Finally, the UWEC project was ambitious in seeking to evaluate its efforts. Rarely are faculty development programs evaluated. A comprehensive evaluation of the UWEC program was constrained by our inability to identify

evaluation instruments that would match closely the program's objectives and by the limited budget available to do the evaluation. Those wishing to evaluate faculty development programs hoping to stimulate critical thinking must anticipate these difficulties.

The optimal evaluation of this type of faculty development program would include multiple year follow-up interviews with and observations of faculty participants. Even those faculty who were most positively affected will need several semesters to transform their critical thinking objectives into effective classroom practice. Coordinators of such faculty development efforts should be sensitive to the need for several follow-up meetings so participants can revitalize their shared commitment and discuss effective classroom strategies.

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Table 1

Disciplines of Experimentals and Controls

| Discipline | Group E | Group C |
|---|---|---|
| Nursing | 11 | 2 |
| English | 8 | 2 |
| Psychology | 4 | 2 |
| Business Administration | 3 | 1 |
| Communication and Theater Arts | 3 | 0 |
| Communicative Disorders | 2 | 2 |
| Philosophy | 2 | 1 |
| Political Science | 2 | 1 |
| Secondary Education | 2 | 0 |
| Special Education | 2 | 0 |
| Accountancy | 0 | 1 |
| Biology | 0 | 1 |
| Chemistry | 0 | 1 |
| Counseling | 1 | 0 |
| Elementary Education | 1 | 0 |
| Foundations of Education | 0 | 1 |
| Geology | 1 | 0 |
| History | 1 | 0 |
| Journalism | 1 | 2 |
| Management Information Systems | 1 | 0 |
| Library Science | 1 | 1 |
| Mathematics | 1 | 2 |
| Music | 0 | 2 |
| Physical Education | 1 | 0 |
| Social Work | 1 | 0 |
| Sociology and Anthropology | 1 | 0 |
| Total | 50 | 22 |

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